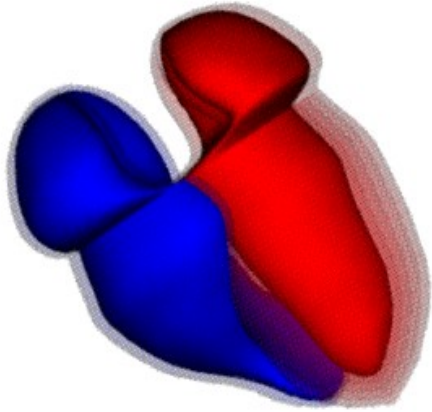




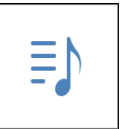
Armed Forces College of Medicine AFCM



The Blood Supply of the Heart

By

Prof Azza Kamal





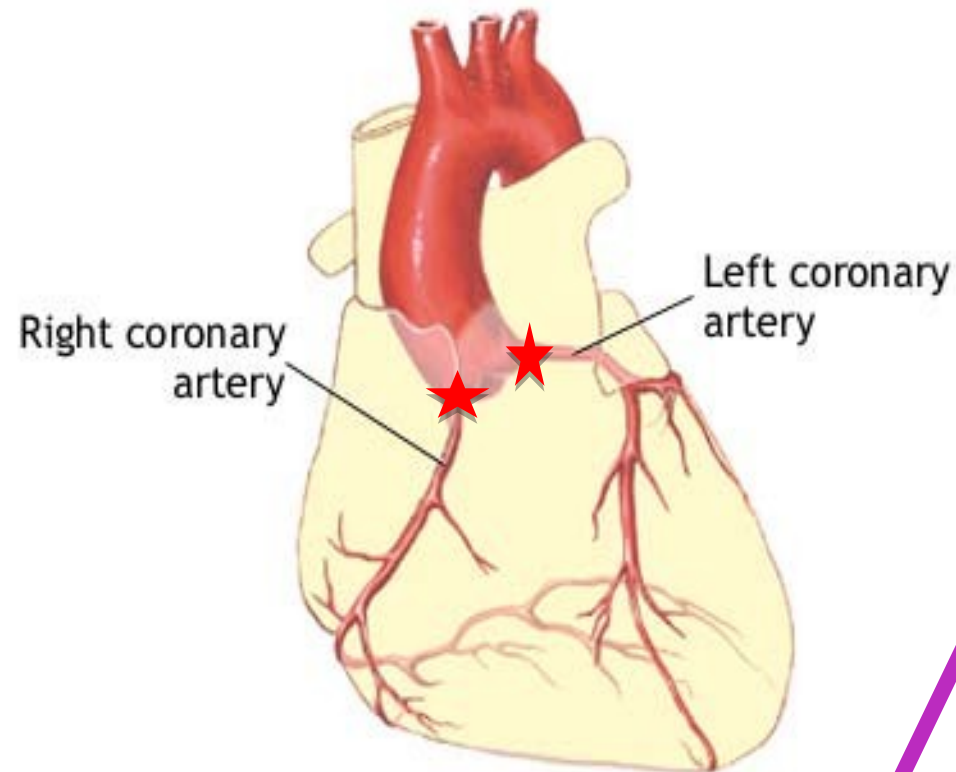
- **By the end of this lecture, each student should be able to:**
 - 1. List** the arteries supplying heart.
 - 2. Describe** origin, course and branches of each artery.
 - 3. Explain** the venous drainage of the heart.
 - 4. Correlate** the distribution of the vessels with the clinically related cases

KEY POINTS OF THE LECTURE

- 1) Course and branches of the right and left coronaries
- 2) Cardiac veins draining into the coronary sinus
- 3) Veins pouring directly into the cavity of cardiac chambers
- 4) The greater, middle and small cardiac veins accompanying branches of coronary arteries

Arterial Supply of the Heart

- Heart is supplied by **right & left coronary arteries** which are branches from ascending aorta
- They are called coronaries as they **surround the heart as a crown** surrounds the head



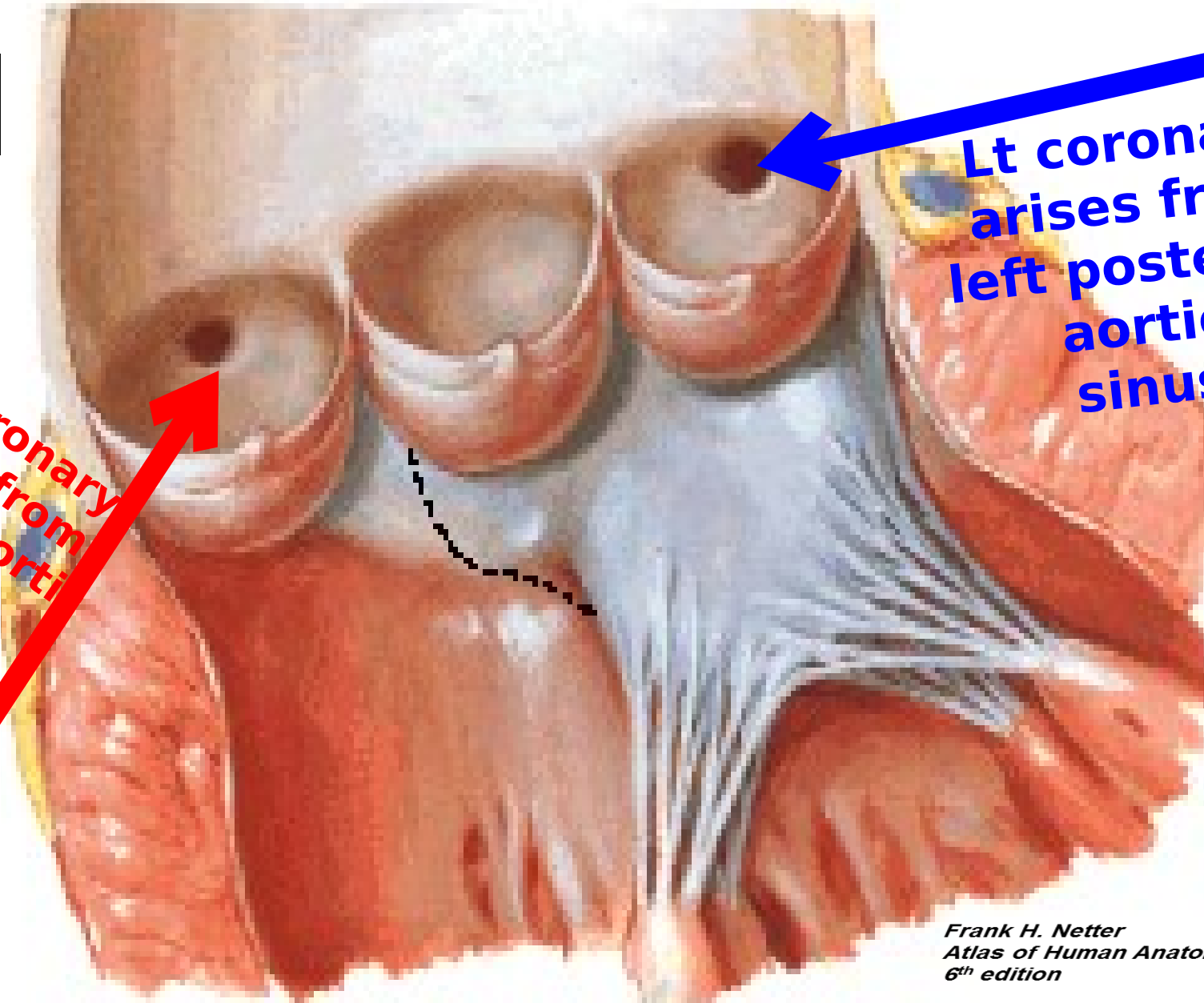
<https://www.google.com.eg/search?hl=en&G&q=coronary+arteries+aorta>





**Rt coronary
arises from
anterior aortic
sinus**

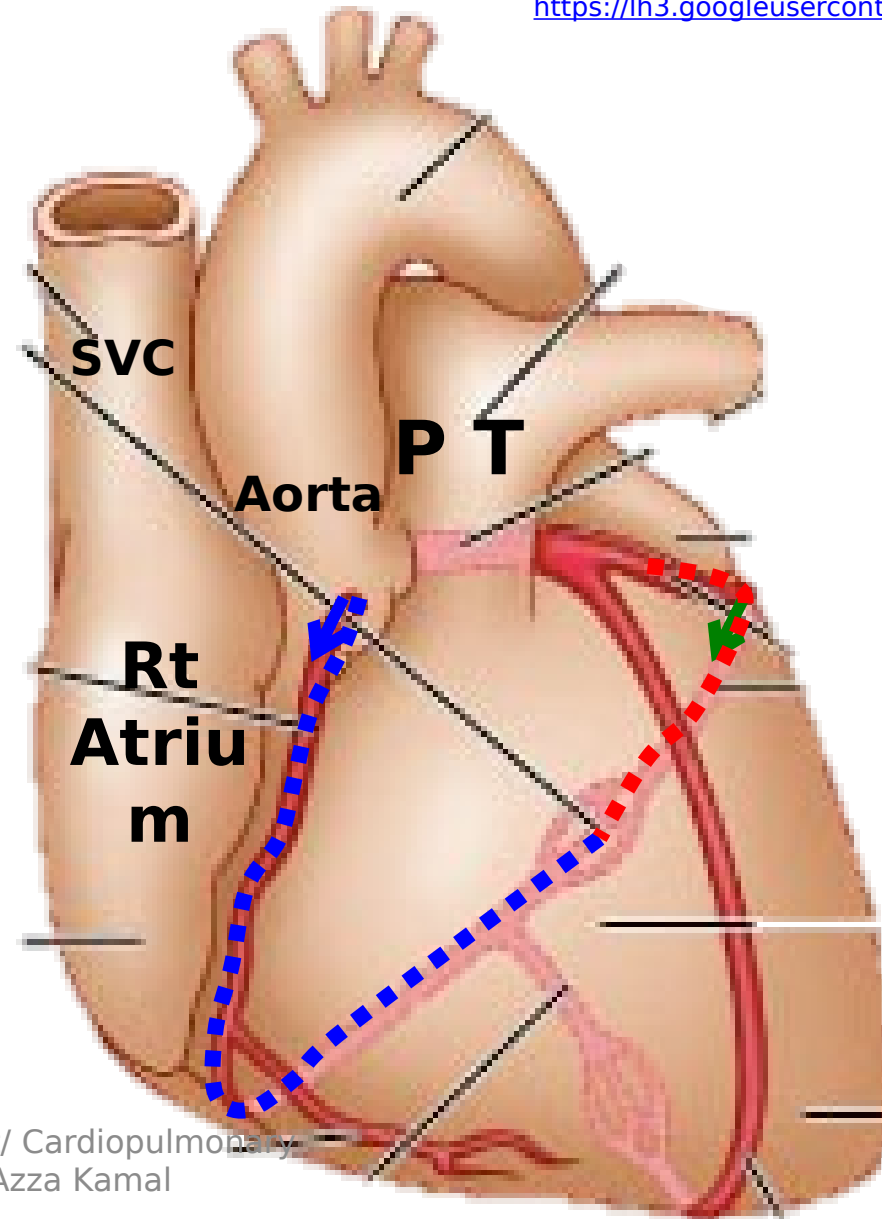
**Lt coronary
arises from
left posterior
aortic
sinus**



*Frank H. Netter
Atlas of Human Anatomy
6th edition*

Right coronary artery

- **Arises from** anterior aortic sinus
- **Runs in** atrio-ventricular groove (AVG) **or** coronary groove till the inferior border of heart □ then backwards in AVG
- **Ends by** anastomosing with circumflex branch of left coronary



<https://lh3.googleusercontent.com/Kv1aySKrlqilm>

Brs. of Rt Coronary :



SA nodal a.

Rt conus a.

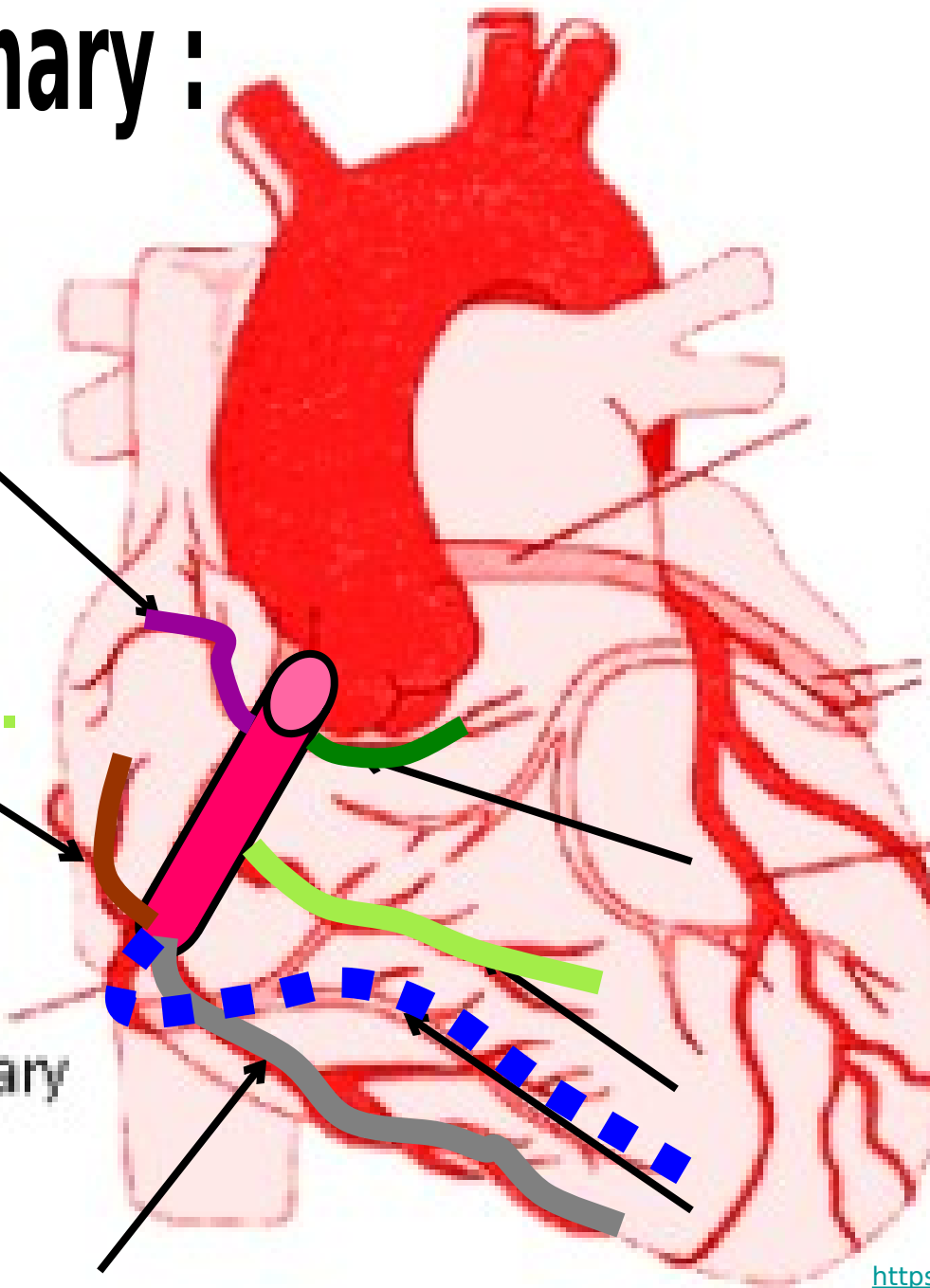
Rt marginal
a.

Atrial &
ventricular brs.

Post.
Interventricular a.

(Rt post. descending)

Right
coronary
artery



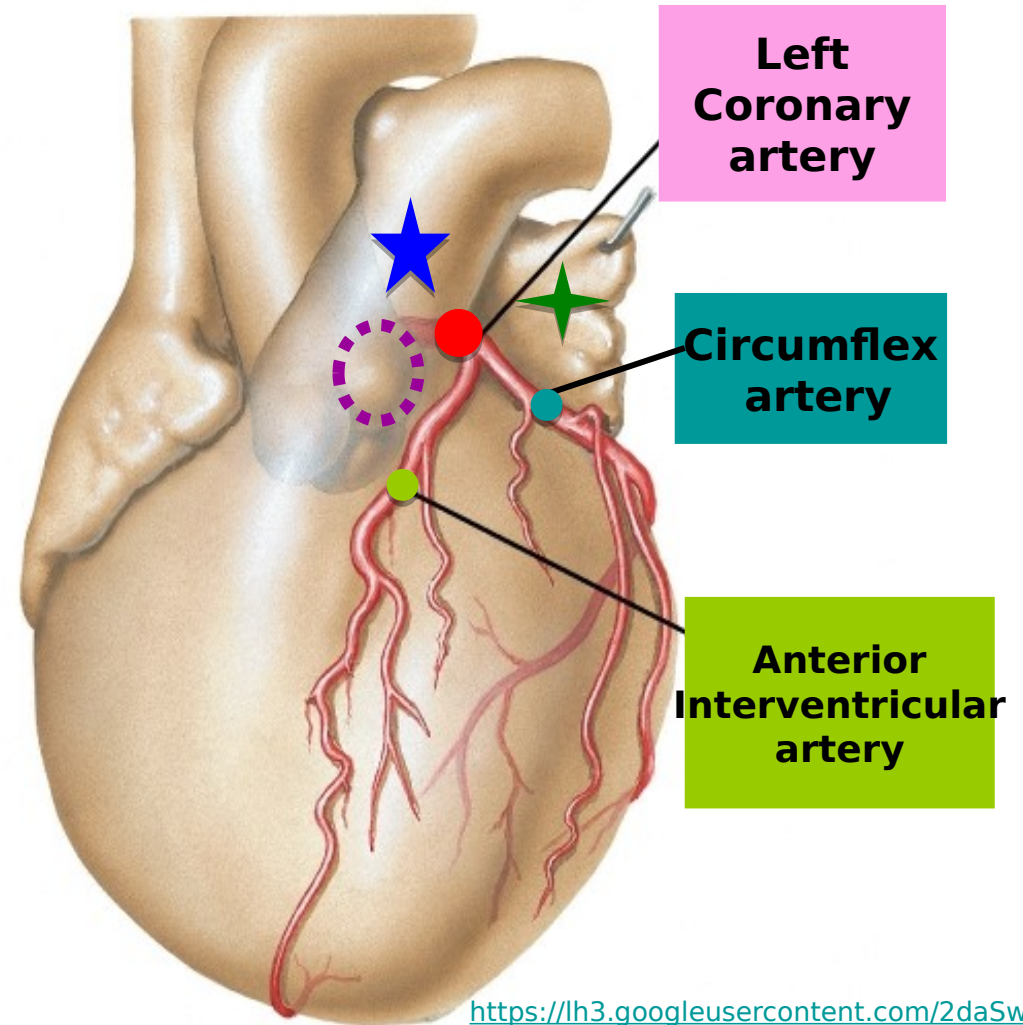
Name of artery	Part it supplies
SA nodal a	SA node in 65% of people
Rt conus a	Infundibulum (conus arteriosus) of right ventricle
Rt marginal a	Right ventricle
Atrial & ventricular brs	Both right & left atria + right ventricle
Posterior Interventricular a (Rt. Post. Descending)	AV node in 80% of people Adjacent parts of both ventricles but not apex of heart Posterior 1/3 of interventricular septum



Left coronary artery



- **Larger** than right coronary
- **Arises from** left posterior aortic sinus
- **Runs between** root of pulmonary trunk & left auricle → upper end of anterior interventricular groove where it **ends** by giving 2 brs:
 - 1) **circumflex artery**
 - 2) **anterior interventricular artery**

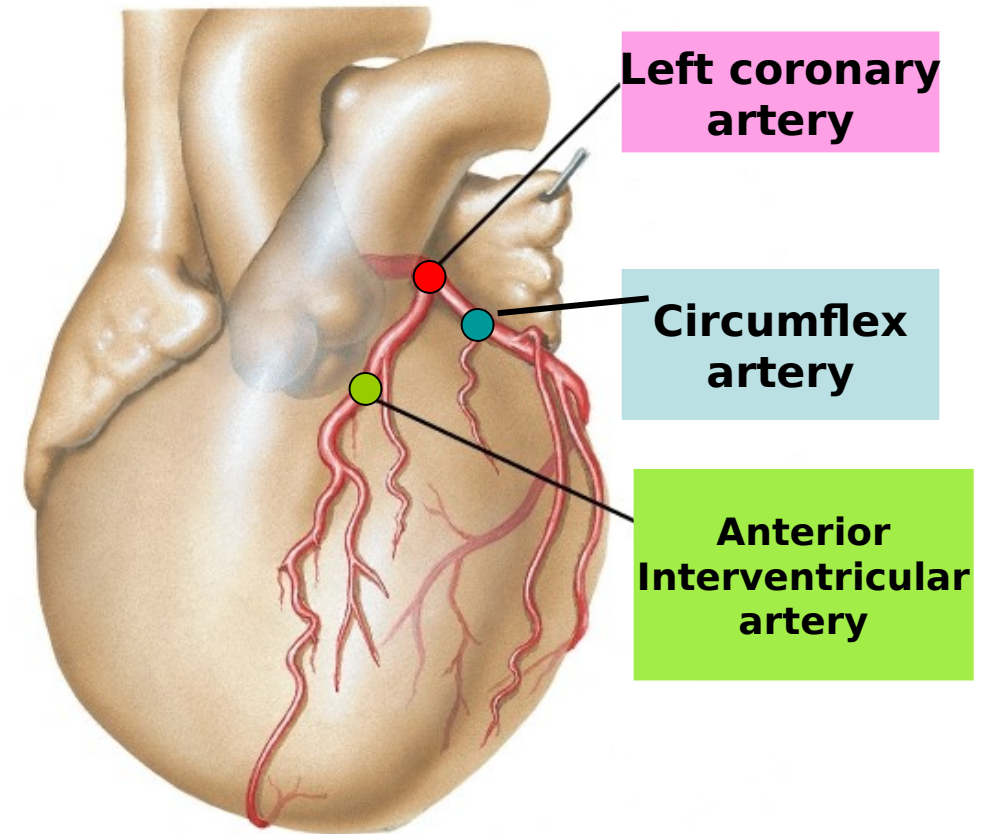


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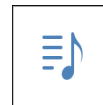
Branches of left coronary

1. **Anterior interventricular artery LAD** □ supplies adj parts of both ventricles as well as **Apex of Heart + anterior 2/3 of interventricular septum + left conus artery** □ infundibulum & it anastomosis with rt conus a. It ends round the inferior border of the heart by anastomosing with posterior interventricular br of right coronary

2. **Circumflex artery** □ runs backwards in posterior part of coronary sulcus & ends by anastomosing with right



https://lh3.googleusercontent.com/2daSwMObeOx_AcNkVaHm



Blood Supply of Conducting System of the Heart

Arterial supply in minority	Arterial supply in majority	Part of conducting system
35% ◻ circumflex of left coronary	65% ◻ right coronary	SA node
20% ◻ circumflex of left coronary	80% ◻ posterior interventricular of right coronary	AV node
	Right coronary	AV bundle
	Left coronary	Right bundle branch
	Right & Left coronaries	Left bundle branch



Clinical Note:

❑ **The conducting system of the heart receives its blood supply from the coronary arteries.**



❑ Occlusion of the artery supplying the AV bundle is a serious condition resulting in **heart block**, where the ventricles no longer receive cardiac impulse from the atria and they start to beat independently of the atria at a slower rate



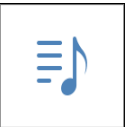


Applied Anatomy

- **Coronary arteries** are considered as **functional end arteries**, because anatomically coronaries & their branches do anastomose, but these anastomosis can not provide an effective collateral circulation if a large artery is obstructed.
- **Anastomosis** are poor in young age but **become more efficient as one gets older** as a result of



- Is sudden coronary occlusion more dangerous if it occurs at **young age** or **old age** & **WHY?**



- **Thrombosis of a large coronary artery if not treated immediately sudden death**



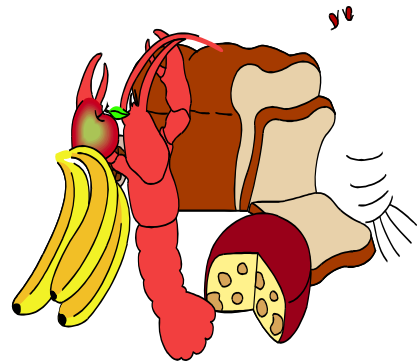
- **Sudden occlusion of a small branch myocardial infarction**



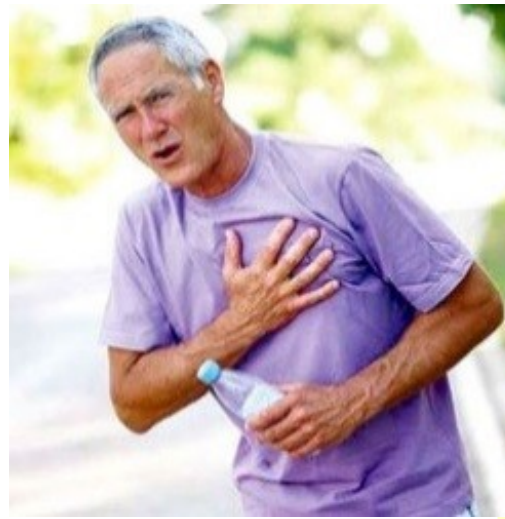
- **Gradual occlusion of coronaries or spasm of coronaries angina pectoris**

Angina

Predisposing factors



Heavy meals



Exertion

Relieving factors



Rest



*sublingual
nitroglycerin*

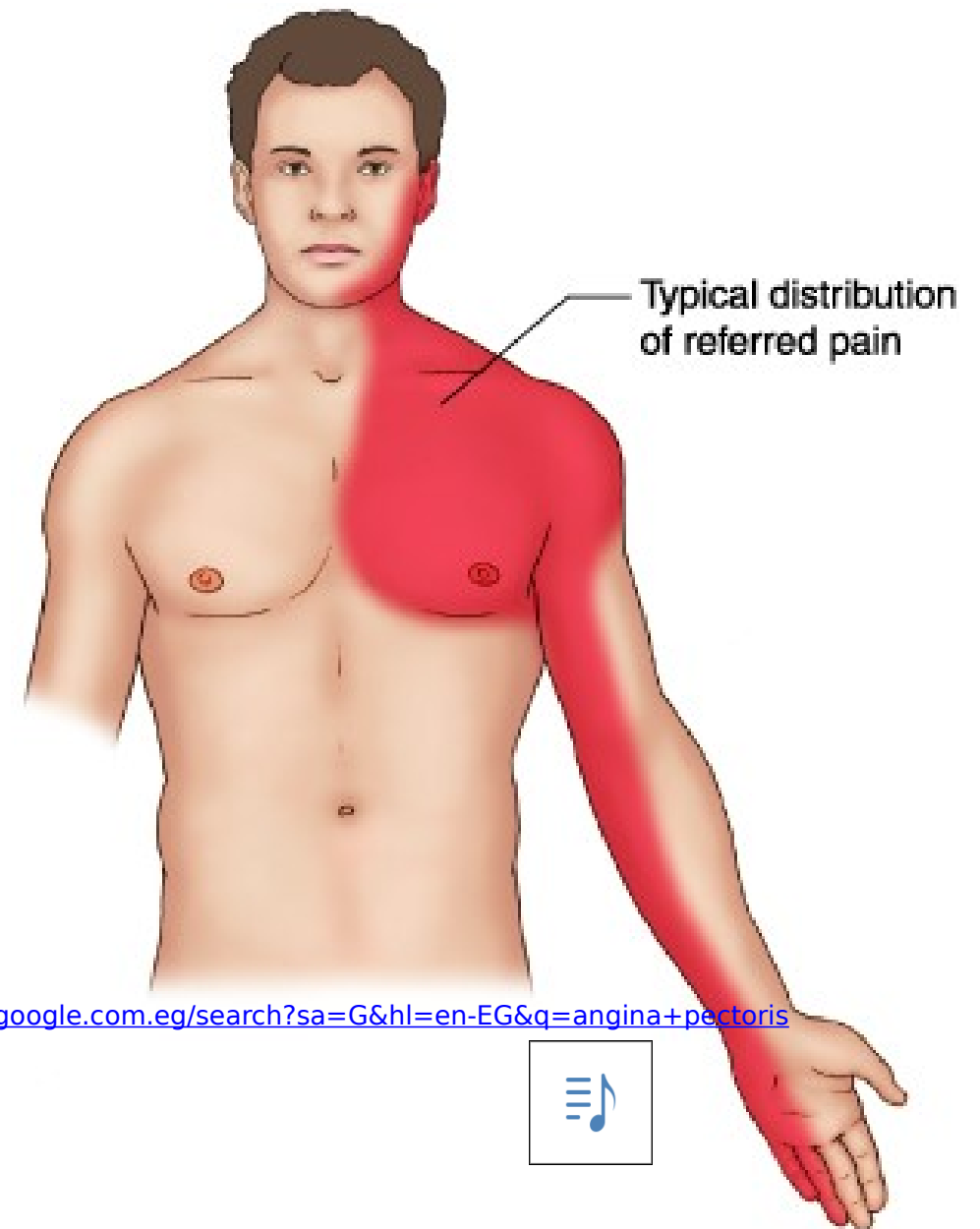


❑ Pain from angina occurs on exertion & is relieved by rest.

❑ It is a substernal pain + left pectoral pain

❑ Referred to left shoulder & medial aspect of left upper limb

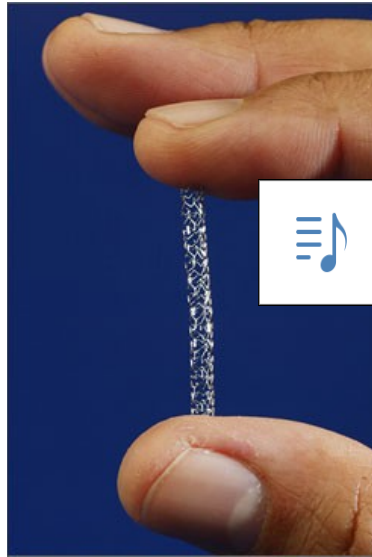
❑ (Visceral afferents from coronaries and cutaneous innervation of these areas are from



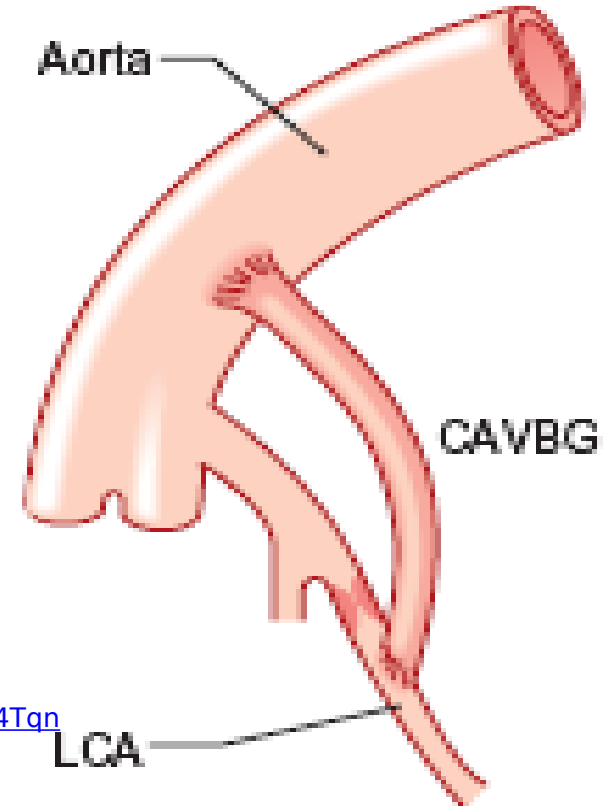
RECENT TECHNIQUES FOR TREATING CORONARY OBSTRUCTION



<https://lh3.googleusercontent.com/H0aKP7G0IQNN7hHmN>



<https://lh3.googleusercontent.com/n66Aw4fTl4Tqn>



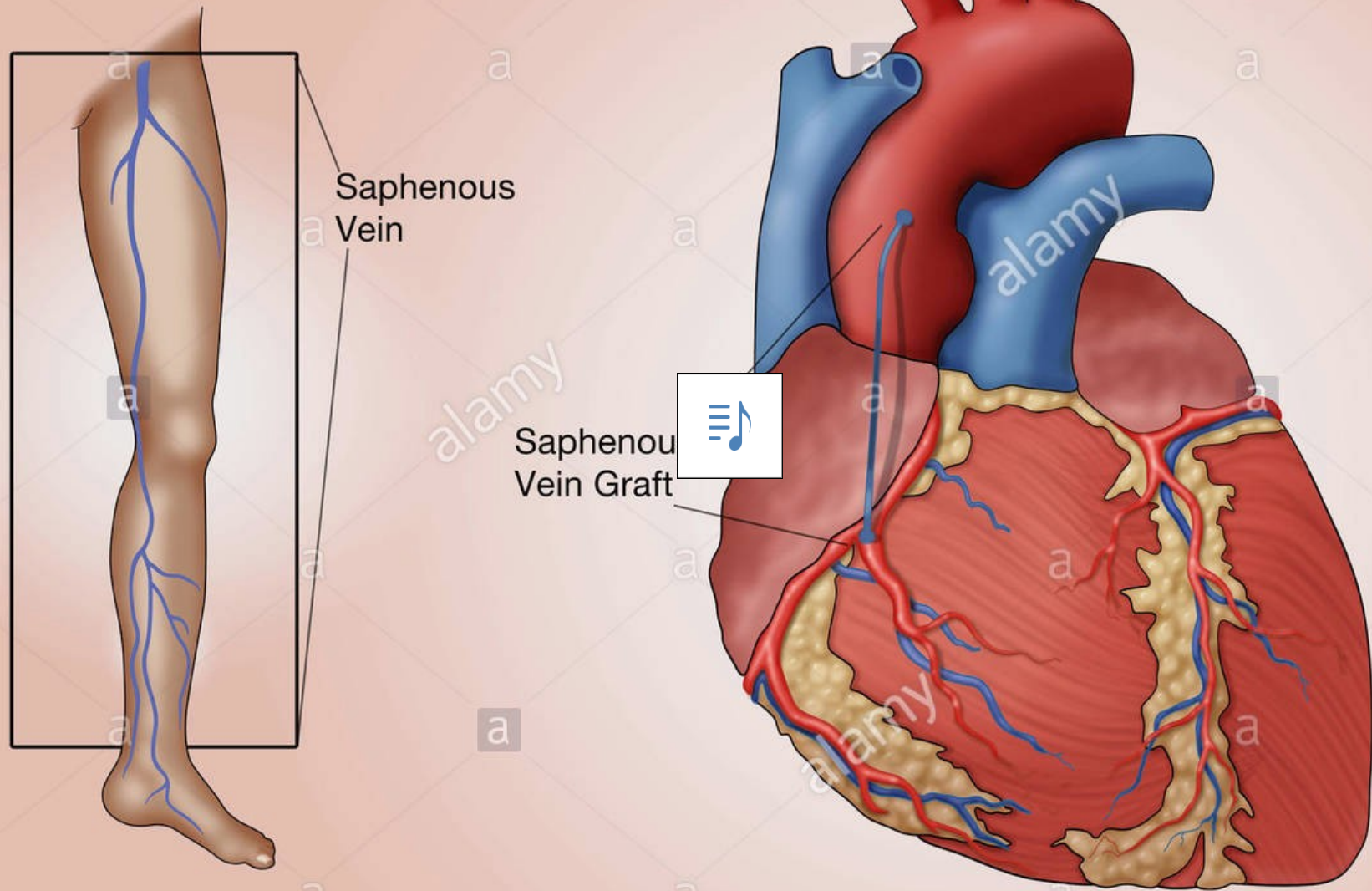
CORONARY STENT

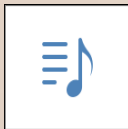
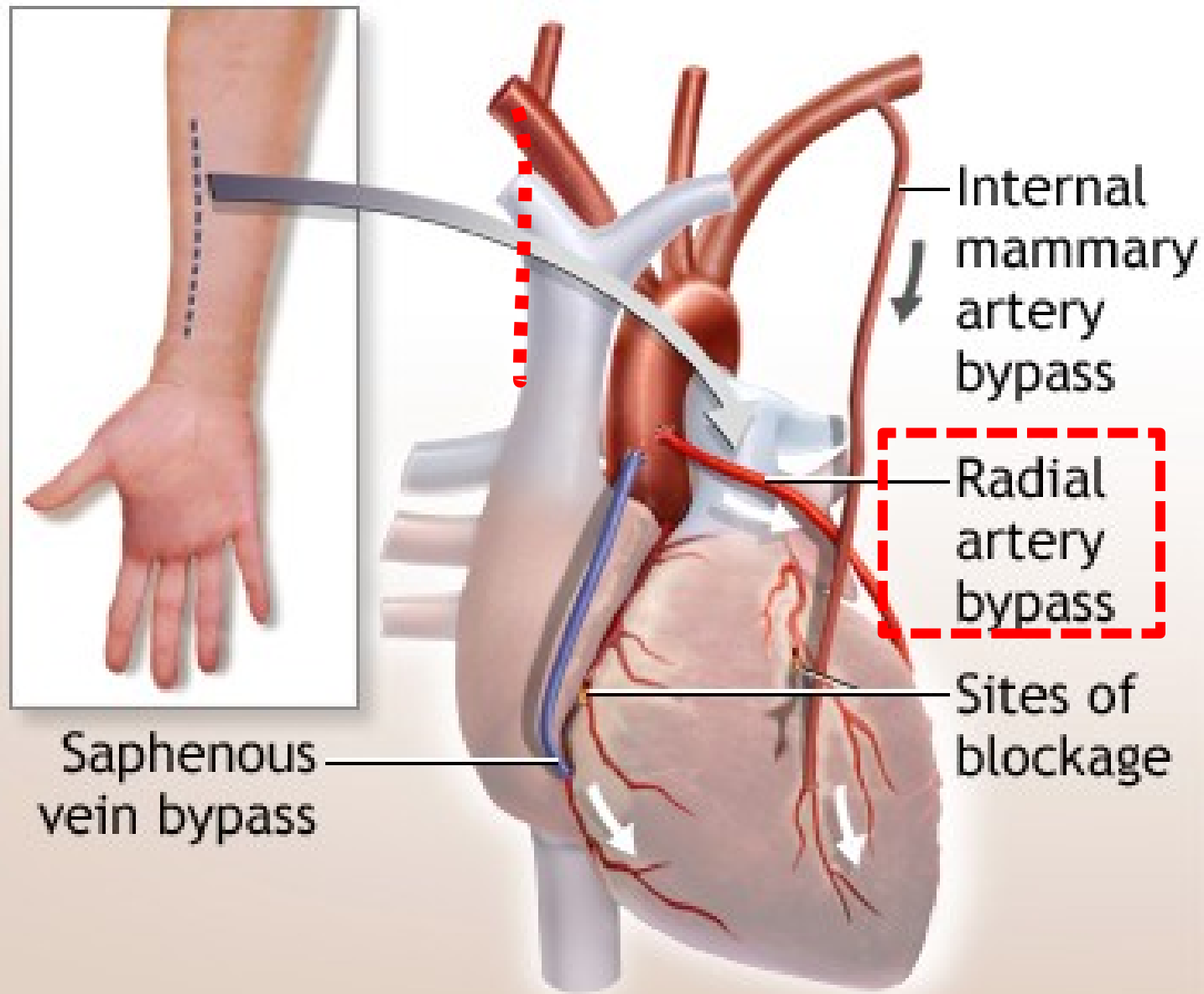
Surgical techniques

Cardiopulmonary
Kamal

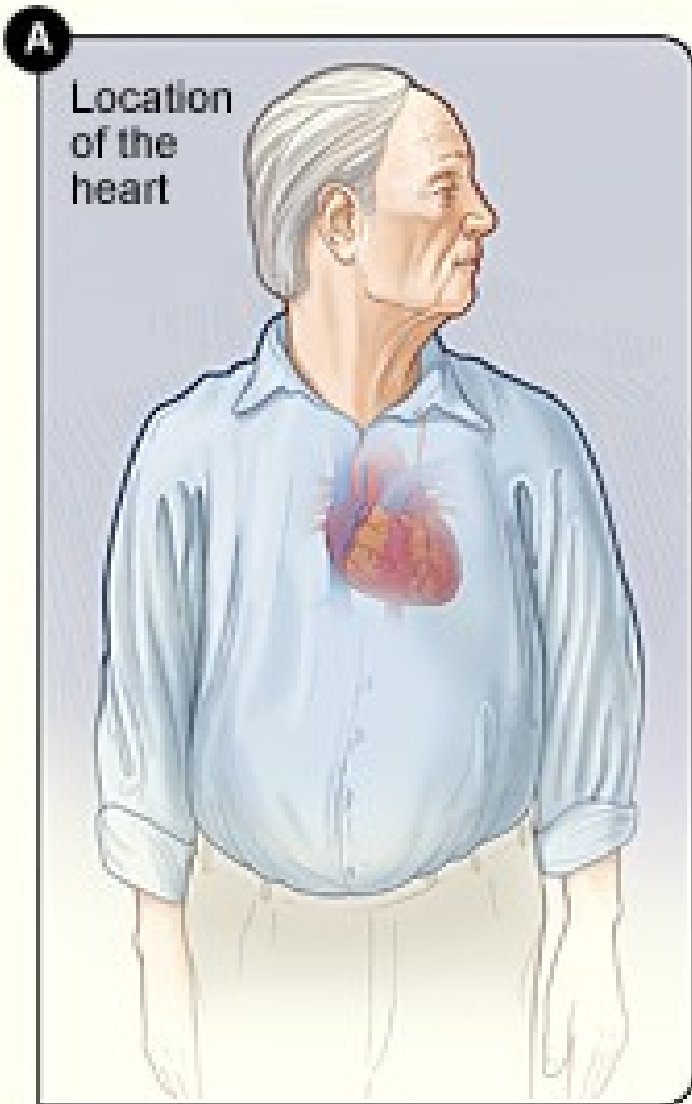
CORONARY

CORONARY BYPASS SURGERY

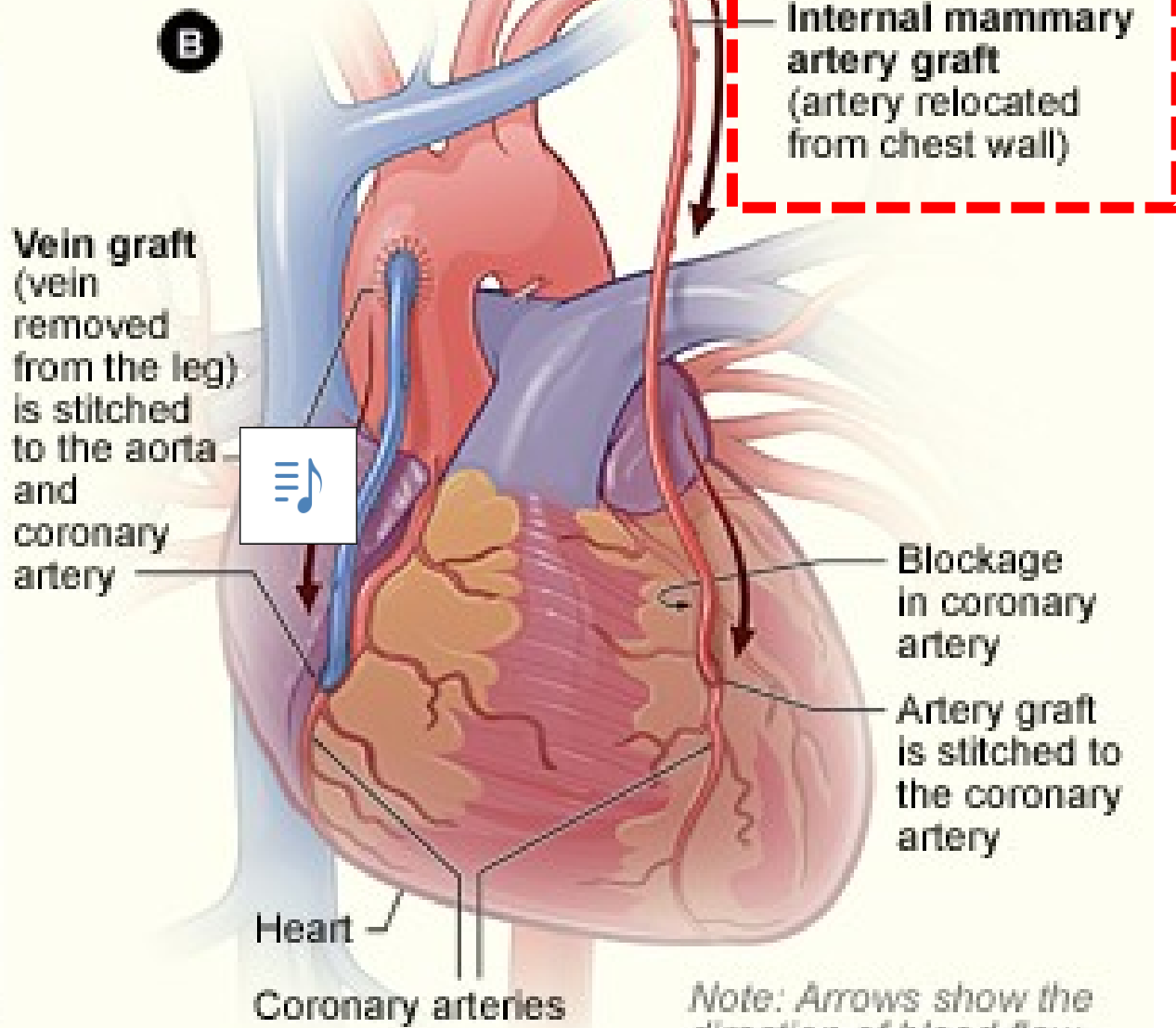




ADAM.



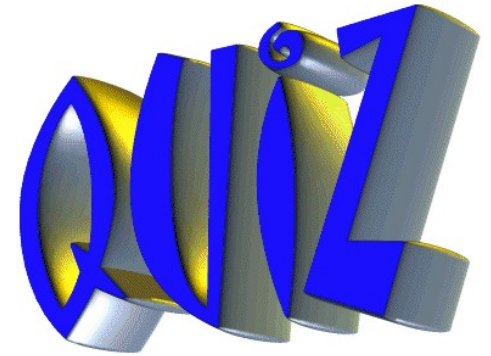
<https://cardiacsurgery.ucsf.edu/media/>



As a cardiologist, you are concerned about blockage of the artery to the SA node in a patient. This artery usually ☐ arises from which of the following?

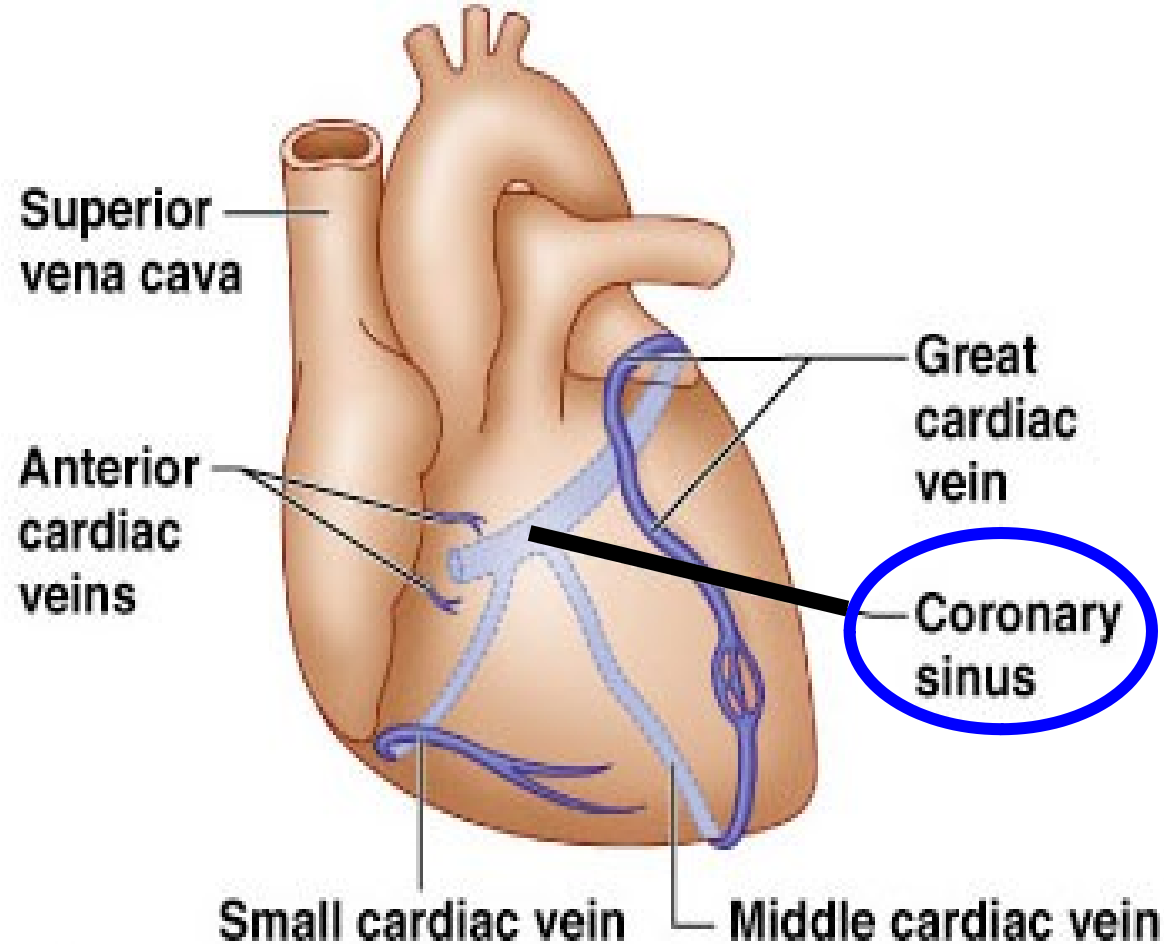
- A. Right coronary artery
- B. Right marginal artery
- C. Posterior interventricular artery
- D. Anterior interventricular artery

MCQ to test origin, course and branches of right & left coronary arteries.



Venous drainage of the heart

- **Most veins of the heart accompany the arteries**
- **Most cardiac veins end in the coronary sinus.**



<https://www.google.com.eg/search?sa=G&hl=en-EG&q=coronary+blood+vessels+of+the+heart>

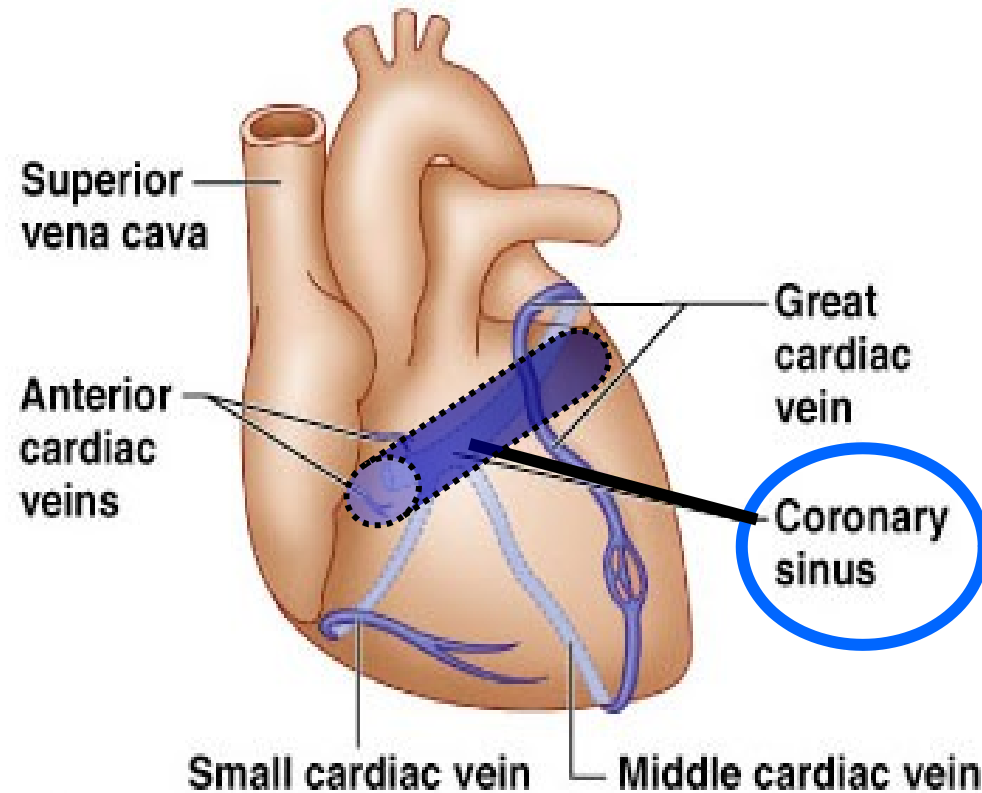


The heart is drained by :

- 1. The coronary sinus & its tributaries**
- 2. The anterior cardiac veins**
- 3. Venae cordis minimae**

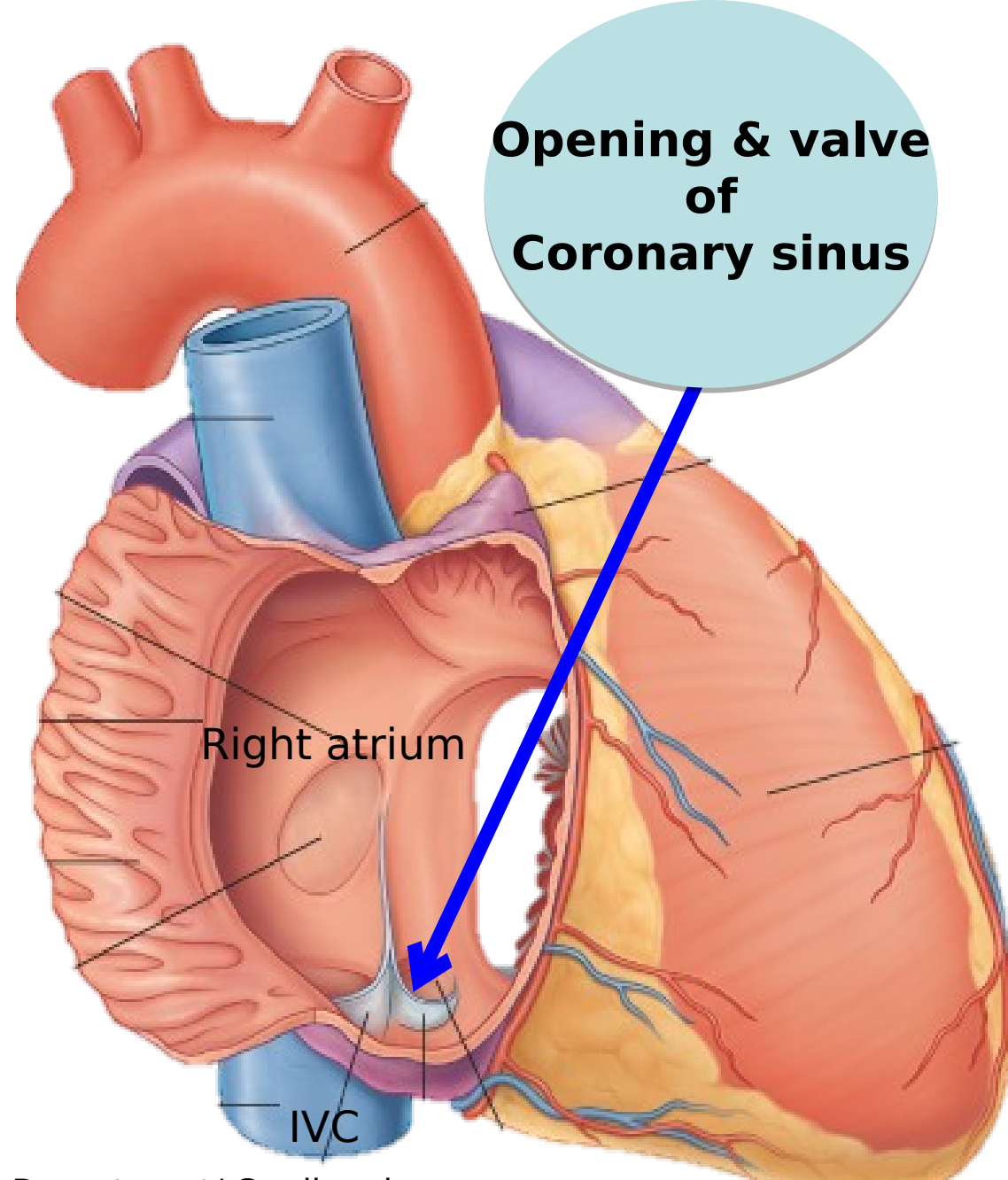
The coronary sinus

- ❑ A venous channel (3cm long)
- ❑ Lies in posterior part of atrioventricular groove AVG (coronary groove)



<https://www.google.com.eg/search?sa=G&hl=en-EG&q=coronary+blood+vessels+of+the+heart>

- ❑ **Coronary sinus ends by opening into cavity of right atrium (just to the left of IVC opening)**
- ❑ **Its orifice has a small**



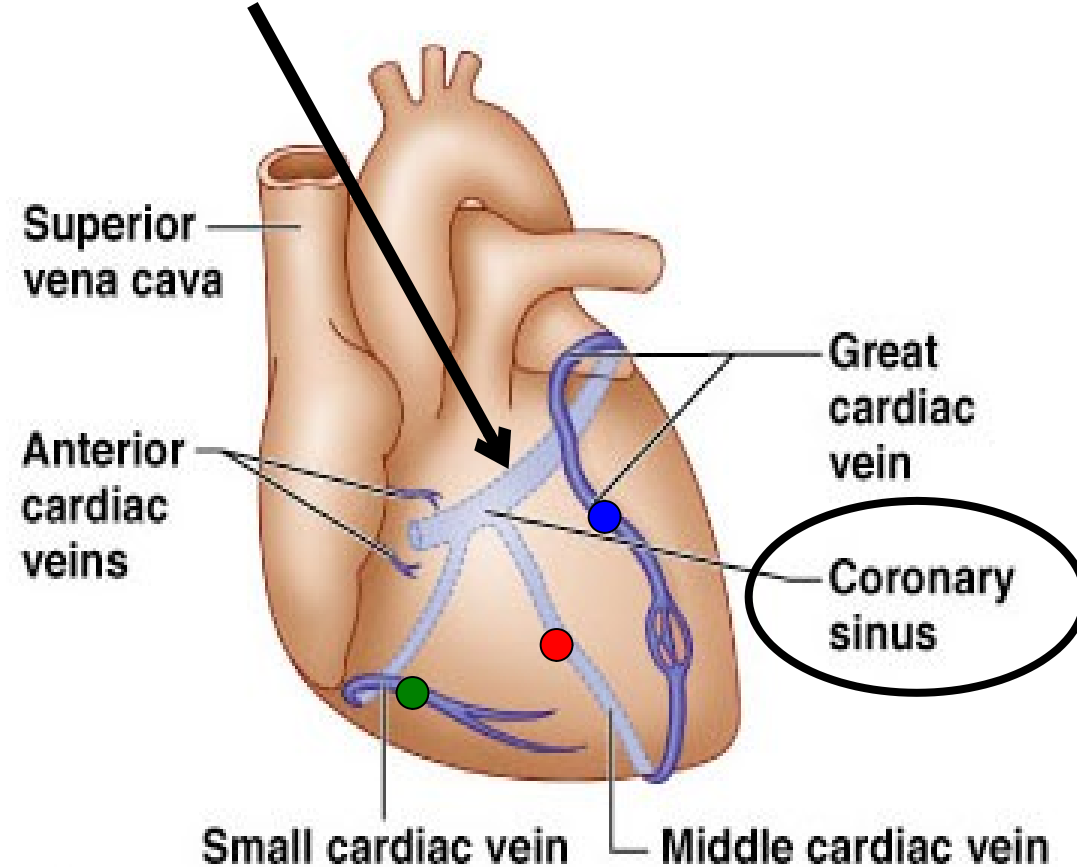
The Coronary Sinus



- **Receives the following**

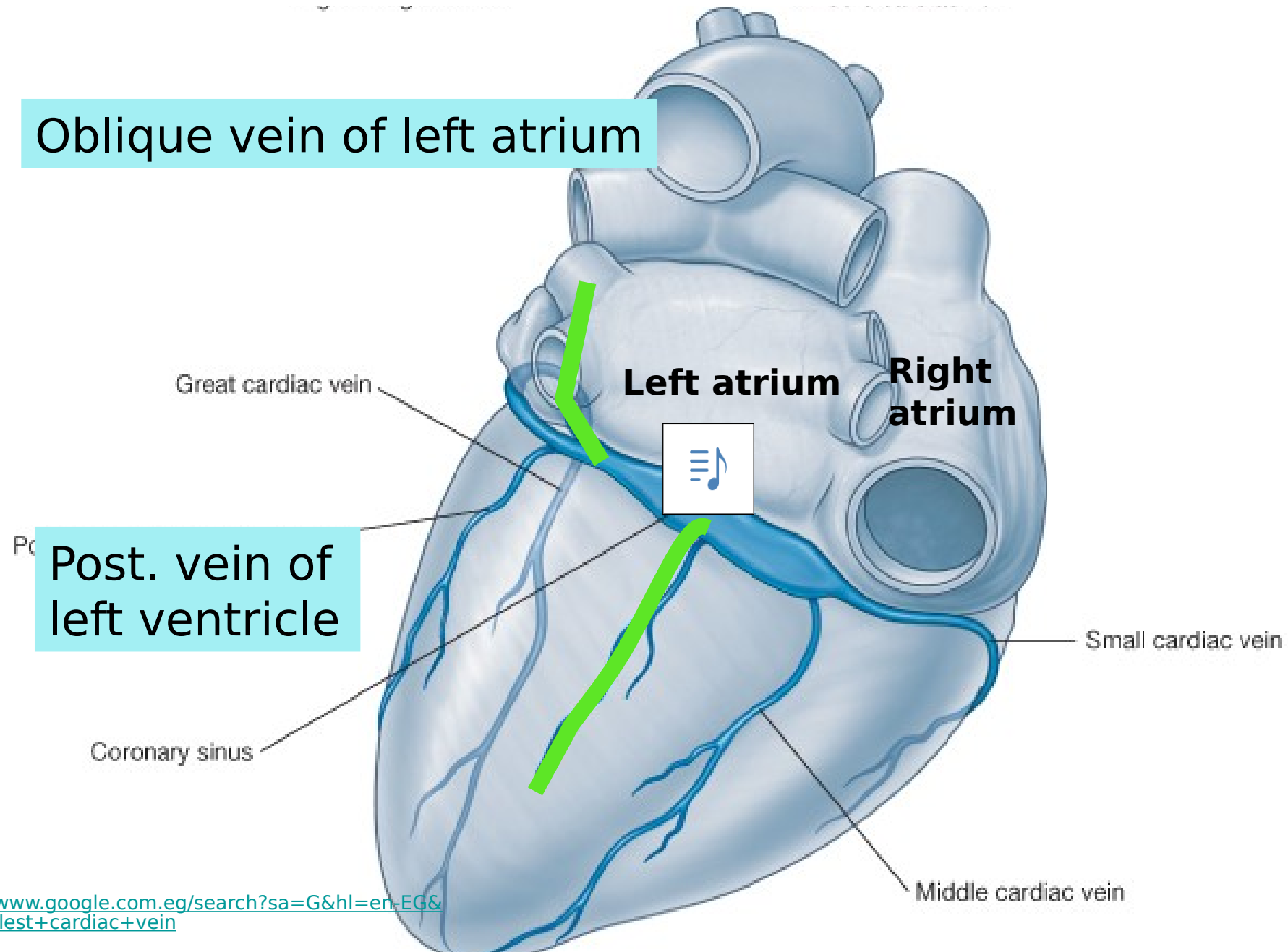
tributaries:

- 1. Great cardiac v**
- 2. Middle cardiac v**
- 3. Small cardiac v**
- 4. Posterior v of left ventricle**
- 5. Oblique v of left atrium**

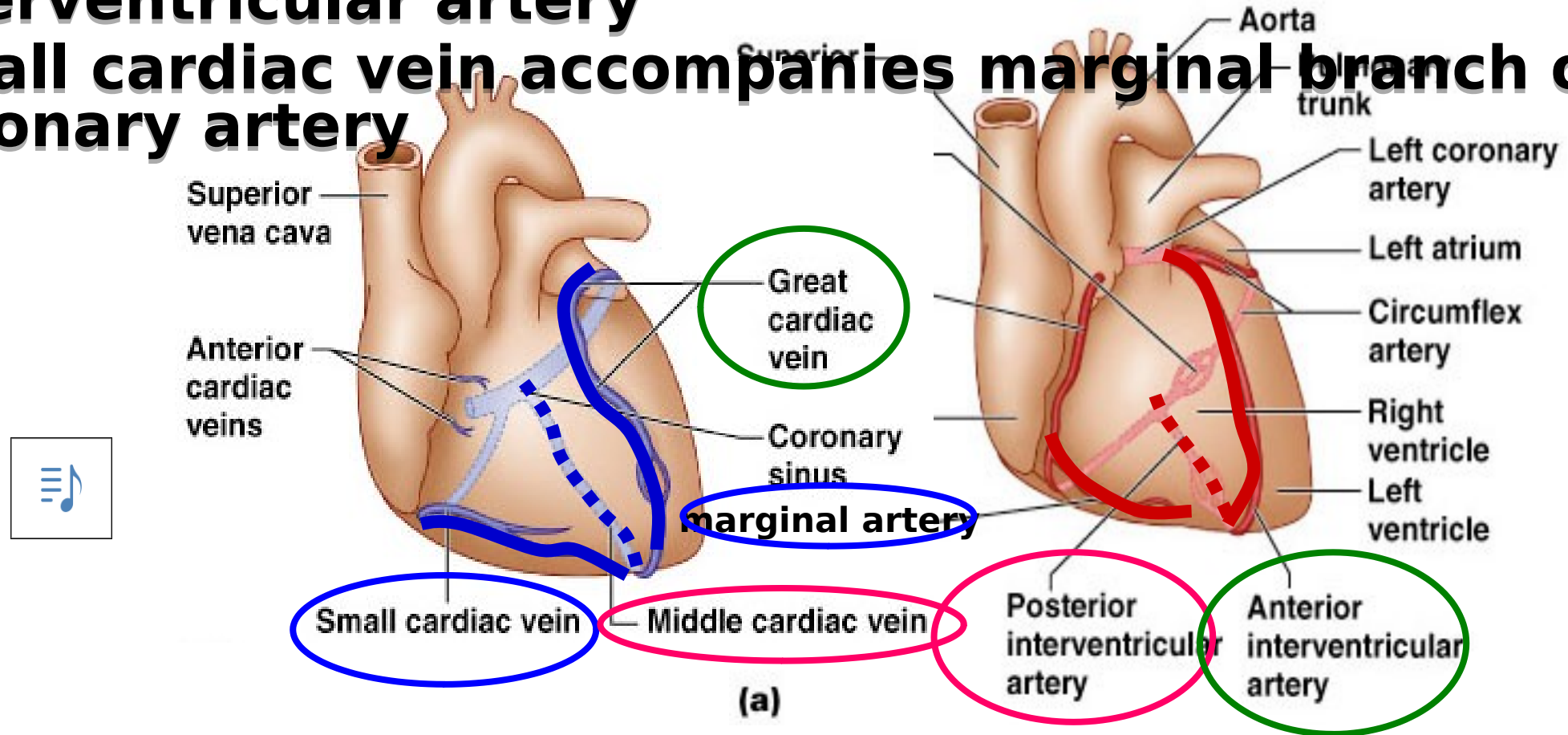


<https://www.google.com.eg/search?sa=G&hl=en-EG&q=coronary+blood+vessels+of+the+heart>

Oblique vein of left atrium



- Great cardiac vein accompanies the anterior interventricular artery **LAD**
- Middle cardiac vein accompanies the posterior interventricular artery
- Small cardiac vein accompanies marginal branch of right coronary artery



<https://www.google.com.eg/search?sa=G&hl=en-EG&q=coronary+blood+vessels+of+the+heart>

Veins which do not open into the coronary sinus

- **Anterior cardiac veins** □ 3-4 veins which drain the anterior wall of right ventricle & pour directly into the right atrium
- **Venae cordis minimi** □ minute veins in the walls of each chamber & pour directly into the cavity of that chamber



WHEN THERE IS

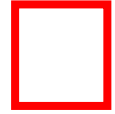
A POP QUIZ

Which of the following veins pour directly into the coronary sinus?

- A. Venae cordis minimi
- B. Anterior cardiac vein
- ☒ C. Small cardiac vein

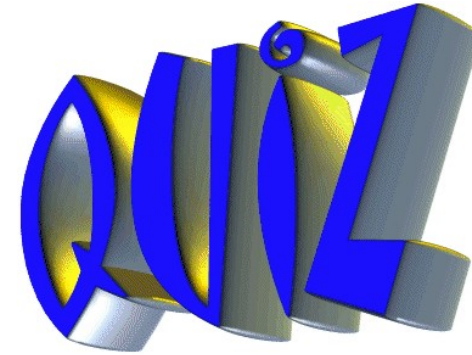
MCQ tests cardiac veins draining into coronary sinus.

Which of the following veins pours directly into the cavity of the chamber which it drains?



- A. Venae cordis minimi
- B. Great cardiac vein
- C. Middle cardiac vein
- D. Small cardiac vein
- E. Oblique vein of left atrium

MCQ tests veins draining directly into the cavity of cardiac chambers.



The posterior interventricular artery is accompanied by which of the following veins?

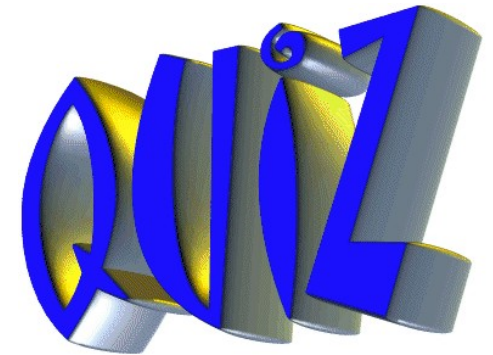
A. Oblique vein of left atrium

☒ B. Middle cardiac vein

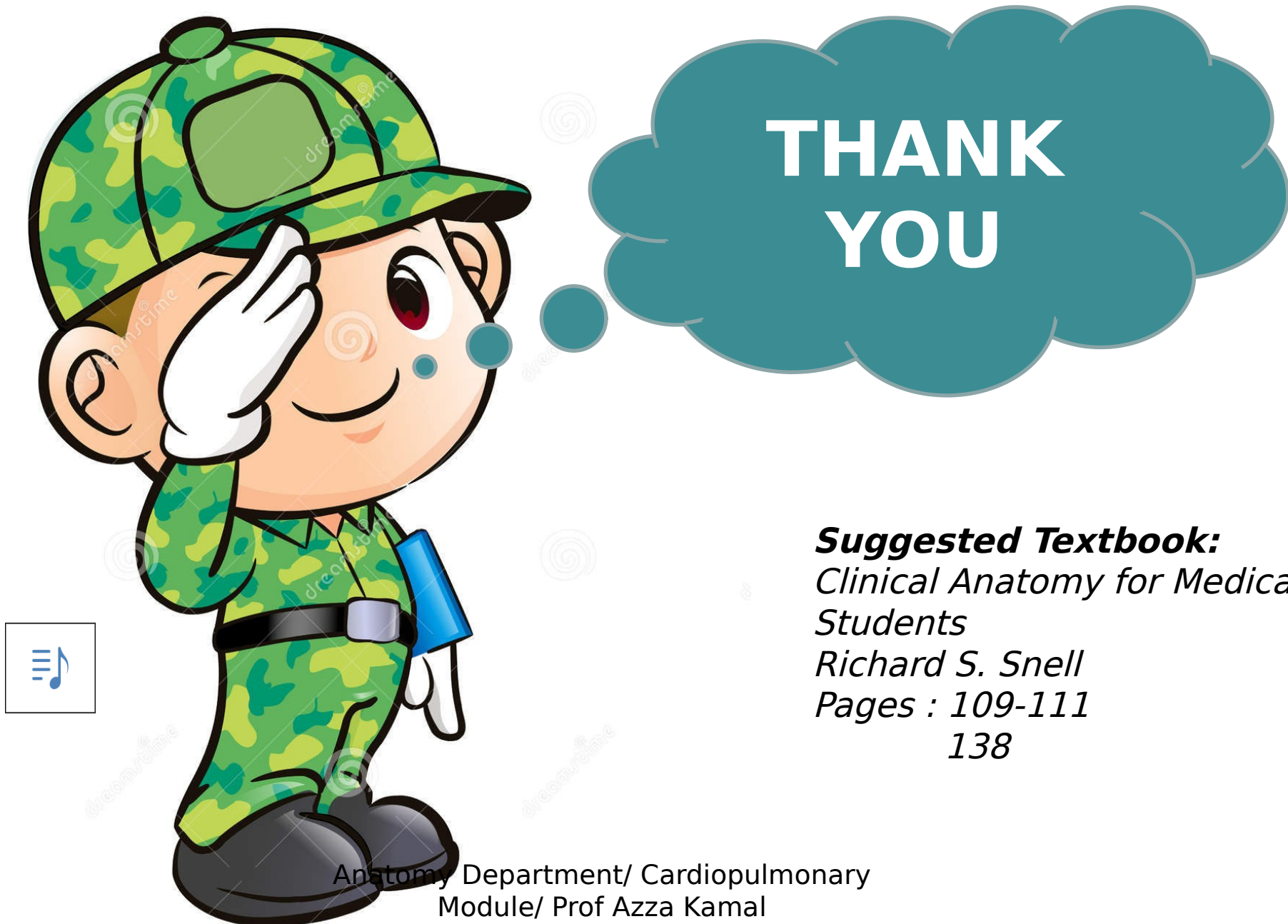
C. Small cardiac vein

D. Great cardiac vein

E. Anterior cardiac veins



MCQ to test great , middle & small cardiac veins & accompanying branches of coronary arteries.



Suggested Textbook:
*Clinical Anatomy for Medical
Students*
Richard S. Snell
Pages : 109-111
138